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PRELIMINARY REPORT
INDUSTRY SERIES

1987 Census of Manufactures

MC87-I-35A(P)
Issued May 1989

ENGINES AND TURBINES AND FARM MACHINERY AND EQUIPMENT

Industries 3511, 3519, 3523, and 3524

INTRODUCTION

This report presents preliminary statistics from the 1987 Census of Manufactures for those establishments classified in the industries listed above. These data will be superseded by a more comprehensive final paperbound report. The method of data collection and use of administrative data are discussed in detail in the appendix.

All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The definitions of these industries are the same as those used in the 1987 Standard Industrial Classification (SIC) Manual.[1]

INDUSTRY 3511, TURBINES AND TURBINE GENERATOR SETS

In the 1987 Census of Manufactures, Industry 3511, Turbines and Turbine Generator Sets, had employment of 22.9 thousand. The employment figure was 29 percent below the 32.4 thousand reported in 1982. Compared with 1986, employment in 1987 decreased 7 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The total value of shipments for establishments classified in this industry was $3.4 billion. The products primary to this industry appear in table 2 and aggregated to $3.2 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $1.6 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3519, INTERNAL COMBUSTION ENGINES, N.E.C.

In the 1987 Census of Manufactures, Industry 3519, Internal Combustion Engines, N.E.C., had employment of 63.5 thousand. The employment figure was 20 percent below the 79.6 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was $11.0 billion. The products primary to this industry appear in table 2 and aggregated to $10.9 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $5.9 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3523, FARM MACHINERY AND EQUIPMENT

In the 1987 Census of Manufactures, Industry 3523, Farm Machinery and Equipment, had employment of 56.9 thousand. The employment figure was 41 percent below the 96.1 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was $6.9 billion. The products primary to this industry appear in table 2 and aggregated to $6.4 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $3.2 billion in 1987. Data on specific materials consumed appear in table 3.

[1] **Standard Industrial Classification Manual: 1987.** For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock No. 041-001-00314-2.

Address inquiries to Bureau of the Census, Industry Division, Washington, DC 20233, or call **Mary Jane Gwynn** (301) 763-7304.

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INDUSTRY 3524, LAWN AND GARDEN EQUIPMENT

In the 1987 Census of Manufactures, Industry 3524, Lawn and Garden Equipment, had employment of 25.1 thousand. The employment figure was 41 percent above the 17.8 thousand reported in 1982. Compared with 1986, employment in 1987 increased 17 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The total value of shipments for establishments classified in this industry was $4.6 billion. The products primary to this industry appear in table 2 and aggregated to $4.0 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to $2.7 billion in 1987. Data on specific materials consumed appear in table 3.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in the tables in this publication:

-	Represents zero.
(D)	Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
(NA)	Not available.
(NC)	Not comparable.
(S)	Withheld because estimate did not meet publication standards on the basis of either the response rate or a consistency review.
(X)	Not applicable.
(Z)	Less than half the unit shown.
do	Ditto.
n.e.c.	Not elsewhere classified.
n.s.k.	Not specified by kind.
pt.	Part.
r	Revised.
SIC	Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

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Table 1. Historical Statistics for the Industry: 1987 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendix.]

Year[1]	Companies[2] (no.)	All establishments[3] Total (no.)	All establishments[3] With 20 employees or more (no.)	All employees Number (1,000)	All employees Payroll (million dollars)	Production workers Number (1,000)	Production workers Hours (millions)	Production workers Wages (million dollars)	Value added by manufacture[4] (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories[4] (million dollars)	Ratios Specialization (percent)	Ratios Coverage (percent)
INDUSTRY 3511, TURBINES AND TURBINE GENERATOR SETS															
1987 Census	(NA)	79	42	22.9	859.6	11.8	26.5	364.6	1 967.0	1 578.0	3 439.3	91.4	1 270.6	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	24.7	870.2	13.3	27.6	410.4	1 814.9	1 416.8	3 219.9	82.1	1 113.4	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	26.6	921.3	14.0	29.1	433.2	2 052.1	1 536.9	3 654.5	95.2	1 099.8	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	27.5	868.8	14.6	29.0	400.9	2 149.0	1 346.1	3 624.0	116.3	1 214.1	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	25.0	743.0	14.9	29.0	363.7	1 699.8	1 267.4	3 197.8	114.0	1 254.5	(NA)	(NA)
1982 Census	71	86	49	32.4	870.8	18.9	37.4	431.6	2 152.9	1 515.0	3 676.3	127.9	1 501.3	94	80
1981 ASM	(NA)	(NA)	(NA)	36.5	894.8	21.6	44.2	429.4	2 123.3	1 625.3	3 735.2	78.5	1 007.0	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	36.1	820.1	21.8	44.2	409.8	2 002.5	1 497.6	3 483.6	121.8	841.3	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	37.2	762.3	22.1	44.8	379.7	1 771.6	1 288.3	3 087.9	91.6	821.2	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	39.5	730.7	24.0	48.4	378.3	1 478.8	1 216.0	2 733.0	59.9	886.6	(NA)	(NA)
1977 Census	69	84	38	40.9	710.1	24.8	51.2	369.0	1 556.4	1 245.0	2 733.7	45.8	828.7	92	82
1976 ASM	(NA)	(NA)	(NA)	44.8	705.7	27.0	55.2	367.1	1 560.1	1 384.9	2 905.0	70.4	798.3	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	43.7	609.9	26.8	54.8	324.2	1 264.9	1 262.6	2 527.7	86.8	730.2	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	50.0	631.0	31.0	61.8	344.4	1 414.6	1 215.1	2 520.0	78.9	750.1	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	47.9	592.6	29.1	59.1	314.7	1 334.3	1 043.6	2 322.1	100.9	609.0	(NA)	(NA)
1972 Census	59	75	46	46.2	548.9	28.8	59.2	299.1	1 225.3	968.6	2 189.0	93.5	528.3	92	90
INDUSTRY 3519, INTERNAL COMBUSTION ENGINES, N.E.C.															
1987 Census	(NA)	273	147	63.5	2 022.9	44.7	89.2	1 341.1	5 043.9	5 927.4	10 973.3	517.7	1 358.4	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	65.5	2 054.6	44.9	86.9	1 309.3	5 142.8	5 719.8	10 896.2	338.0	1 383.3	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	72.3	2 201.7	50.2	96.3	1 426.7	5 206.1	5 882.9	11 286.5	404.9	1 512.5	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	78.2	2 369.0	55.2	108.9	1 575.4	5 692.6	6 298.9	11 869.7	417.3	1 778.3	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	70.6	1 898.8	45.8	84.7	1 164.4	4 092.9	4 727.9	8 985.7	375.6	1 606.3	(NA)	(NA)
1982 Census	202	253	159	79.6	1 979.0	52.4	95.4	1 222.6	3 916.4	5 131.7	9 363.4	590.9	1 776.2	89	87
1981 ASM	(NA)	(NA)	(NA)	89.1	2 191.8	63.2	126.0	1 471.2	5 247.4	6 322.4	11 545.6	637.1	1 728.3	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	89.4	1 964.8	63.4	125.1	1 321.2	4 564.7	5 550.8	10 194.2	323.1	1 715.8	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	101.1	2 010.8	74.2	143.8	1 372.7	4 521.9	5 790.2	10 096.5	401.2	1 736.4	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	95.9	1 778.3	70.0	140.2	1 218.6	4 010.6	5 764.3	9 618.0	317.0	1 558.6	(NA)	(NA)
1977 Census	186	232	131	88.8	1 526.6	65.3	130.1	1 036.2	3 406.5	4 459.7	7 696.5	285.8	1 342.0	91	88
1976 ASM	(NA)	(NA)	(NA)	79.8	1 232.9	58.2	114.0	819.9	2 640.2	3 549.7	6 104.1	227.2	1 083.9	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	77.5	1 066.6	55.9	106.9	705.4	2 169.4	2 918.3	5 093.3	252.1	969.3	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	80.8	1 079.0	60.6	124.8	750.9	2 251.4	2 850.1	4 918.7	278.3	977.7	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	75.8	919.1	57.0	116.8	642.9	1 933.0	2 125.3	3 989.8	197.4	732.1	(NA)	(NA)
1972 Census	145	179	109	69.9	771.4	52.2	104.3	534.5	1 674.2	1 747.1	3 318.4	92.0	639.5	91	85
INDUSTRY 3523, FARM MACHINERY AND EQUIPMENT															
1987 Census	(NA)	1 614	467	56.9	1 415.3	39.0	74.9	840.9	3 706.6	3 213.5	6 872.2	197.5	1 548.2	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	57.1	1 384.2	38.2	74.3	777.4	3 414.2	3 217.7	6 745.4	138.9	1 574.4	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	67.1	1 631.4	44.9	84.6	959.7	4 201.6	3 916.7	8 211.6	163.5	1 809.6	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	75.4	1 794.6	51.5	97.1	1 074.4	5 115.5	4 741.9	9 858.1	158.7	2 084.9	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	82.0	1 827.9	53.4	98.1	1 048.4	4 526.2	4 417.5	8 982.7	143.7	2 090.4	(NA)	(NA)
1982 Census	1 787	1 903	620	96.1	2 067.4	62.9	113.6	1 205.8	5 200.8	5 217.8	10 743.0	341.2	2 232.2	94	95
1981 ASM	(NA)	(NA)	(NA)	125.0	2 631.3	87.8	161.3	1 669.9	6 268.1	7 512.9	13 948.9	522.5	2 159.9	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	133.4	2 576.9	95.6	178.8	1 674.1	6 057.0	6 721.1	12 845.2	458.9	2 333.5	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	140.3	2 461.6	104.1	201.9	1 662.8	6 023.3	7 244.4	12 998.2	360.6	2 395.1	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	121.0	1 982.1	89.2	170.5	1 325.6	4 796.3	5 333.5	10 053.6	317.9	2 109.2	(NA)	(NA)
1977 Census	1 864	2 004	664	131.3	1 971.9	96.2	182.7	1 313.3	4 854.4	5 469.7	10 281.7	341.8	2 083.4	92	95
1976 ASM	(NA)	(NA)	(NA)	127.3	1 741.8	94.3	179.8	1 176.1	4 248.9	4 913.8	9 133.1	254.3	1 991.6	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	130.0	1 669.2	97.9	193.2	1 161.8	3 898.6	4 691.6	8 530.9	301.3	1 910.8	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	132.6	1 558.2	103.2	206.2	1 119.6	3 567.6	3 846.7	7 078.5	199.6	1 783.3	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	123.1	1 292.2	94.7	184.8	912.6	2 777.6	3 096.3	5 693.7	109.3	1 295.8	(NA)	(NA)
1972 Census	1 465	1 547	563	104.6	1 045.7	79.9	157.1	732.3	2 248.0	2 401.5	4 531.4	116.0	998.7	90	94
INDUSTRY 3524, LAWN AND GARDEN EQUIPMENT															
1987 Census	(NA)	164	81	25.1	499.9	19.3	35.6	342.9	1 917.7	2 726.6	4 606.5	109.3	732.7	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	21.5	429.9	16.5	30.6	288.3	1 438.3	2 220.0	3 647.0	54.0	687.2	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	22.3	417.4	17.2	33.3	283.1	1 322.0	2 075.9	3 439.6	70.7	701.4	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	23.2	443.0	17.9	34.1	308.4	1 246.3	2 049.3	3 239.8	65.9	783.3	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	18.8	337.6	13.9	26.6	219.6	1 066.9	1 555.5	2 579.8	43.2	574.3	(NA)	(NA)
1982 Census	151	175	84	17.8	318.1	12.4	24.6	198.7	945.5	1 375.7	2 365.2	51.1	539.6	91	88
1981 ASM	(NA)	(NA)	(NA)	18.1	300.2	12.9	24.4	183.4	780.6	1 219.9	2 005.4	35.7	509.4	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	20.3	313.4	14.3	27.0	191.5	930.8	1 310.6	2 247.4	56.8	538.6	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	24.8	346.7	18.8	35.4	231.2	1 072.7	1 518.4	2 536.9	55.0	546.1	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	21.9	274.6	16.6	30.4	179.6	808.4	1 119.3	1 882.9	39.8	431.8	(NA)	(NA)
1977 Census	136	154	91	19.5	222.4	14.6	27.5	141.3	631.7	939.1	1 569.5	28.5	379.3	92	82
1976 ASM	(NA)	(NA)	(NA)	18.7	207.1	13.8	27.3	134.8	534.2	862.2	1 400.6	33.2	359.8	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	19.6	202.8	14.1	27.6	131.8	466.6	832.4	1 352.7	46.1	373.0	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	25.3	232.1	19.1	36.6	156.5	646.4	998.0	1 562.9	40.8	500.7	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	21.7	193.6	16.5	32.2	129.7	468.5	738.6	1 174.1	29.2	305.4	(NA)	(NA)
1972 Census	100	110	86	20.7	165.5	15.1	29.3	108.3	453.2	652.2	1 059.1	47.6	287.2	90	82

Note: Establishments of single unit companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. Data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were estimated based on administrative-record information from other agencies in conjunction with industry averages. These establishments accounted for the following percent of total value of shipments: SIC 3511, 1%; SIC 3519, 3%; SIC 3523, 12%; and SIC 3524, 9%.

[1]In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1972, see 1972 Census of Manufactures, vol. II, table 1a of the Industry chapter.

[2]For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

[3]Includes establishments with payroll at any time during year.

[4]Beginning with the 1982 Census of Manufactures, all respondents were requested to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior Censuses and annual surveys of manufactures in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, inventories and value added by manufacture are not comparable to prior-year data.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3511- --	**TURBINES AND TURBINE GENERATOR SETS**						
	Total	**(NA)**	**(X)**	**3 188.9**	**(NA)**	**(X)**	**3 662.3**
35111 --	Turbine generators, turbine generator sets, and parts	(NA)	(X)	1 503.7	30	(X)	786.5
35111 01	Turbine generators and turbine generator sets						
35111 02	Parts and accessories						
35111 00	Turbine generators, turbine generator sets, and parts, n.s.k.	(NA)	(X)	1 503.7	30	(X)	786.5
35112 --	Steam, gas, hydraulic, and wind turbines and parts	(NA)	(X)	1 642.3	(NA)	(X)	2 846.9
	Steam turbines and other vapor turbines:						
35112 03	For marine propulsion ..... number				3	(D)	[3]
35112 13	For other applications ..... do	(NA)	1 145	215.4	10	2 314	786.9
	Kilowatt or horsepower capacity (rated or normal) for all steam turbines and other vapor turbines:						
35112 21	Less than 373 kW (500 hp) ..... number				(NA)	[4]1 242	(X)
35112 22	373 kW (500 hp) to 745 kW (999 hp) ..... do				(NA)	[4]365	(X)
35112 23	746 kW (1,000 hp) to 7,459 kW (9,999 hp) ..... do	(NA)	1 109	(X)	(NA)	[4]606	(X)
35112 24	7,460 kW (10,000 hp) or more ..... do	(NA)	36	(X)	(NA)	[4]101	(X)
35112 61	Hydraulic turbines (all sizes) ..... do	(NA)	(D)	[5]	3	(D)	[3]
	Gas turbines (except aircraft):						
35112 74	Less than 5,000 kW (6,702 hp) ..... number						
35112 76	5,000 kW (6,702 hp) or more ..... do	(NA)	(S)	905.9	19	(S)	879.9
35112 79	Wind turbines ..... do	(NA)	(D)	[5]	(NA)	[6]	[5]
	Parts and accessories (sold separately):						
35112 72	For steam and other vapor turbines	(NA)	(X)	[5]	13	(X)	587.1
35112 71	For hydraulic turbines	(NA)	(X)	[5]	3	(X)	[3]142.1
35112 81	For gas turbines, except aircraft	(NA)	(X)	134.8	24	(X)	450.4
35112 83	For wind turbines	(NA)	(X)	[3]381.6	(NA)	(X)	[5]
35112 00	Steam, gas, hydraulic, and wind turbines and parts, n.s.k.	(NA)	(X)	4.5	(NA)	(X)	6
35110 --	Turbines and turbine generator sets, n.s.k.	(NA)	(X)	42.9	(NA)	(X)	28.9
35110 00	Turbines and turbine generator sets, n.s.k., typically for establishments with 5 employees or more (see note)	(NA)	(X)	42.9	(NA)	(X)	28.9
35110 02	Turbines and turbine generator sets, n.s.k., typically for establishments with less than 5 employees (see note)	(NA)	(X)	-	(NA)	(X)	-
3519- --	**INTERNAL COMBUSTION ENGINES, N.E.C.**						
	Total	**(NA)**	**(X)**	**10 897.2**	**(NA)**	**(X)**	**8 972.4**
35191 --	Gasoline and gas-gasoline engines, except outboard marine, aircraft, automobile, highway truck, bus, and tank:						
35191 00	Gasoline and gas-gasoline engines, except outboard marine, aircraft, automobile, highway truck, bus, and tank (for additional detail, see Current Industrial Report MA-35L, Internal Combustion Engines)	(NA)	(X)	[7]1 474.4	24	(X)	[7]1 001.8
35193 --	Diesel, semidiesel, and dual fuel engines (except automobile, highway truck, bus, and tank):						
35193 00	Diesel, semidiesel, and dual fuel engines (except automobile, highway truck, bus, and tank) (for additional detail, see Current Industrial Report MA-35L, Internal Combustion Engines)	(NA)	(X)	[7]1 198.3	17	(X)	[7]1 548.2
35194 --	Diesel, semidiesel, and dual fuel engines for automobiles, highway trucks, and buses:						
35194 00	Diesel, semidiesel, and dual fuel engines for automobiles, highway trucks, and buses (for additional detail, see Current Industrial Report MA-35L, Internal Combustion Engines)	(NA)	(X)	[7]2 796.1	6	(X)	[7]1 715.6
35195 --	Outboard motors (internal combustion):						
35195 00	Outboard motors (internal combustion) ..... thousands	(NA)	(D)	[8]	9	(D)	[8]
35196 --	Piston-type natural gas engines, including LPG engines (excluding gas turbines):						
35196 00	Piston-type natural gas engines, including LPG engines (excluding gas turbines) (for additional detail, see Current Industrial Report MA-35L, Internal Combustion Engines)	(NA)	(X)	[7]74.5	10	(X)	[7]99.6
35197 --	Tank (except gas turbine) and converted internal combustion engines	(NA)	(X)	[9]1 545.5	(NA)	(X)	[9]1 143.4
35197 21	Tank engines, except gas turbines ..... thousands				3	(S)	[9]764.1
35197 51	Converted engines (basic engines, short blocks purchased from another company or received from other plants of the same company and converted to marine or other uses) ..... do	(NA)	(S)	[9]1 545.5	22	(S)	379.3
35197 00	Tank and converted internal combustion engines, n.s.k.	(NA)	(X)	-	(NA)	(X)	-
35199 --	Parts and accessories for internal combustion engines, except aircraft and gasoline automotive engines and gas turbines	(NA)	(X)	3 724.2	(NA)	(X)	3 405.7
35199 01	Connecting rods ..... millions	(NA)	(S)	42.3	(NA)	(NA)	[10]
35199 06	Crankshafts, engine ..... do	(NA)	(S)	153.9	18	(S)	187.8
35199 09	Camshafts, engine ..... do	(NA)	(S)	65.6	14	(S)	67.5
35199 21	Flywheels ..... do	(NA)	(S)	23.3	7	(D)	[11]
	Engine bearings (halves):						
35199 24	Main (crankshaft) ..... millions	(NA)	(S)	14.7	8	(S)	25.3
35199 25	Connecting rod ..... do	(NA)	(S)	2.3	13	(S)	29.0
35199 33	Other (camshaft, balance shaft, etc.) ..... do	(NA)	(S)	7.1	4	(S)	[12]3.5

See footnotes at end of table.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3519- —	**INTERNAL COMBUSTION ENGINES, N.E.C.**—Con.						
35199 —	Parts and accessories for internal combustion engines except aircraft and gasoline automotive engines and gas turbines—Con.						
	Engine pumps, new:						
35199 27	Oil ..... millions	(NA)	(S)	84.0	10	(S)	23.0
35199 31	Fuel ..... do				6	(S)	22.9
35199 32	Water ..... do	(NA)	(S)	14.8	10	(S)	35.4
	Engine blocks:						
35199 41	For spark ignition internal combustion engines ..... millions	(NA)	(S)	99.1	16	(S)	56.9
35199 42	For other engines ..... do						
	Cylinder liners (sleeves):						
35199 43	For spark ignition internal combustion engines ..... millions	(NA)	*3.6	23.2	13	(S)	78.6
35199 44	For other engines ..... do	(NA)	(S)	56.7			
	Cylinder heads:						
35199 45	For spark ignition internal combustion engines ..... millions	(NA)	(S)	28.0	15	(S)	118.6
35199 46	For other engines ..... do	(NA)	(S)	106.7			
	Intake manifolds and exhaust manifolds:						
35199 47	For spark ignition internal combustion engines ..... millions	(NA)	**2.0	42.4	15	(S)	25.0
35199 48	For other engines ..... do	(NA)	(S)	8.5			
	Valve guides, seats, and tappets:						
35199 51	For spark ignition internal combustion engines	(NA)	(X)	4.6	14	(X)	13.0
35199 52	For other engines						
	Rocker arms and parts:						
35199 53	For spark ignition internal combustion engines	(NA)	(X)	20.4	8	(X)	34.6
35199 54	For other engines						
	Fuel injection systems (multipoint):						
35199 55	For spark ignition internal combustion engines ..... millions	(NA)	(S)	376.7	19	(S)	589.7
35199 56	For other engines ..... do						
	Governors, engine speed:						
35199 57	For spark ignition internal combustion engines ..... millions	(NA)	(S)	82.2	7	(S)	64.1
35199 58	For other engines ..... do						
	Radiators, stationary engine:						
35199 59	For spark ignition internal combustion engines ..... millions	(NA)	(S)	13.6	9	(S)	31.8
35199 60	For other engines ..... do						
	Superchargers, including turbochargers:						
35199 61	For spark ignition internal combustion engines ..... millions	(NA)	(S)	343.6	15	(S)	239.6
35199 62	For other engines ..... do						
	Other parts and accessories:						
35199 91	For spark ignition internal combustion engines ..... millions	(NA)	(S)	459.7	69	(S)	1824.8
35199 92	For other engines ..... do	(NA)	(S)	410.3			
35199 00	Parts and accessories for internal combustion engines, except aircraft and gasoline automotive engines and gas turbines, n.s.k.	(NA)	(X)	1 240.7	(NA)	(X)	954.6
35190 —	Internal combustion engines, n.e.c., n.s.k.	(NA)	(X)	84.1	(NA)	(X)	58.2
35190 00	Internal combustion engines, n.e.c., n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	18.5	(NA)	(X)	31.4
35190 02	Internal combustion engines, n.e.c., n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	65.6	(NA)	(X)	26.8
3523- —	**FARM MACHINERY AND EQUIPMENT**						
	Total	**(NA)**	**(X)**	**6 390.2**	**(NA)**	**(X)**	**10 370.0**
35231 —	Farm type (power take off hp) wheel tractors (2- and 4-wheel drive) (sold with or without attachments) (except contractors' off-highway type, garden tractors, turf tractors, and motor tillers):						
35231 00	Farm type (power take off hp) wheel tractors (2- and 4-wheel drive) (sold with or without attachments) (except contractors' off-highway type, garden tractors, turf tractors, and motor tillers) (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	751.2	17	(X)	2 321.9
35232 —	Farm dairy machines, sprayers and dusters, farm elevators, and farm blowers:						
35232 00	Farm dairy machines and equipment, sprayers and dusters (except aerial types), farm elevators, farm blowers, and attachments (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	267.9	124	(X)	382.2
35233 —	Planting, seeding, and fertilizing machinery, excluding turf machinery:						
35233 00	Planting, seeding, and fertilizing machinery, and attachments (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	315.2	117	(X)	566.5
35235 —	Harvesting machinery:						
35235 00	Harvesting machinery and attachments (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	1 014.8	88	(X)	1 854.1
35236 —	Haying machinery:						
35236 00	Haying machinery and attachments (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	326.7	31	(X)	444.8

See footnotes at end of table.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987			1982		
		Number of companies with shipments of $100,000 or more	Product shipments[1]		Number of companies with shipments of $100,000 or more	Product shipments[1]	
			Quantity[2]	Value (million dollars)		Quantity[2]	Value (million dollars)
3523- --	**FARM MACHINERY AND EQUIPMENT**—Con.						
3523C --	Plows, including plowshares (primary tillage equipment), and harrows, rollers, pulverizers, and similar equipment; and cultivators and weeders (secondary tillage equipment) and attachments:						
3523C 00	Plows, including plowshares (primary tillage equipment), and harrows, rollers, pulverizers, and similar equipment; and cultivators and weeders (secondary tillage equipment) and attachments (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	189.6	113	(X)	[3]424.6
3523E --	All other farm machinery and equipment (excluding parts), including stalk shredders and cutters or rotary mowers, feed grinders and crushers, poultry, hog, and barnyard equipment, farm wagons, self-propelled irrigation systems, etc. except commercial turf equipment:						
3523E 00	All other farm machinery and equipment (excluding parts), including stalk shredders and cutters or rotary mowers, feed grinders and crushers, poultry, hog, and barnyard equipment, farm wagons, self-propelled irrigation systems, etc., except commercial turf equipment (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	912.1	343	(X)	[3] 156.3
35239 --	Parts for farm machinery for sale separately, excluding commercial turf and grounds equipment	(NA)	(X)	1 287.2	(NA)	(X)	2 327.2
	Parts for farm machinery (except operator cabs):						
35239 26	Parts for wheel tractors (farm type) (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	212.8	35	(X)	956.3
35239 31	Parts (except for wheel tractors) (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	1 028.2	284	(X)	1 231.4
35239 53	Operator cabs for farm equipment (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	4.5	14	(X)	78.0
35239 00	Parts for farm machinery, for sale separately, excluding commercial turf and grounds equipment, n.s.k.	(NA)	(X)	41.6	(NA)	(X)	61.9
3523F --	Commercial turf and grounds care equipment, including parts and attachments:						
3523F 00	Commercial turf and grounds care equipment, including parts and attachments (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	511.9	47	(X)	238.2
35230 --	Farm machinery and equipment, n.s.k.	(NA)	(X)	817.4	(NA)	(X)	653.7
35230 00	Farm machinery and equipment, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	344.0	(NA)	(X)	233.1
35230 02	Farm machinery and equipment, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	473.4	(NA)	(X)	420.6
3524- --	**LAWN AND GARDEN EQUIPMENT**						
	Total	**(NA)**	**(X)**	**4 034.8**	**(NA)**	**(X)**	**2 385.2**
35241 --	Consumer nonriding lawn, garden, and snow equipment:						
35241 00	Consumer nonriding lawn, garden, and snow equipment (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	1 697.7	63	(X)	1 167.5
35244 --	Consumer riding lawn, garden, and snow equipment:						
35244 00	Consumer riding lawn, garden, and snow equipment (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	1 545.9	19	(X)	765.2
35246 --	Parts and attachments for consumer lawn, garden, and snow equipment:						
35246 00	Parts and attachments for consumer lawn, garden, and snow equipment (for additional detail, see Current Industrial Report MA-35A, Farm Machinery and Lawn and Garden Equipment)	(NA)	(X)	698.5	64	(X)	399.3
35240 --	Lawn and garden equipment, n.s.k.	(NA)	(X)	92.6	(NA)	(X)	53.3
35240 00	Lawn and garden equipment, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	23.6	(NA)	(X)	18.9
35240 02	Lawn and garden equipment, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	69.0	(NA)	(X)	34.4

Note: In 1987 Census of Manufactures, data for establishments of small single unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoffs used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1987 and 1982 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

[1]Data reported by all producers, not just those with shipments of $100,000 or more.

[2]For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

[3]For 1982, data for product codes 35112 03, 35112 61, and 35112 71 were combined to avoid disclosing data for individual companies.

[4]For 1982, data for product codes 35112 21, 35112 22, 35112 23, and 35112 24 excluded steam turbines and other vapor turbines for marine propulsion.

[5]For 1987, data for product codes 35112 61, 35112 71, 35112 72, and 35112 79 are combined with product code 35112 83 to avoid disclosing data for individual companies.

[6]For 1982, data for product codes 35112 79 and 35112 83 were not collected separately.

[7]Includes basic engines (short block engines), primarily automotive type, shipped for conversion to marine or other nonautomotive uses.

Table 2. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[8]For 1987, data for product code 35195 00 are combined with product codes 35197 21 and 35197 51 to avoid disclosing data for individual companies.
[9]For 1982, data for product code 35195 00 were combined with product code 35197 21 to avoid disclosing data for individual companies.
[10]For 1982, data for product code 35199 01 were not collected separately but were included with product codes 35119 91 and 35119 92.
[11]For 1982, data for product code 35199 21 were combined with product codes 35119 91 and 35119 92 to avoid disclosing data for individual companies.
[12]For 1982, data for product code 35199 33 included only camshaft bearings (halves).
[13]For 1982, data for cultivators and weeders (secondary tillage equipment) were included with product code 3523E 00. For 1982, data for stalk shredders and cutters or rotary mowers were included with product code 3523C 00.

Table 3. Materials Consumed by Kind: 1987 and 1982

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity[1]	Delivered cost (million dollars)	Quantity[1]	Delivered cost (million dollars)
	INDUSTRY 3511, TURBINES AND TURBINE GENERATOR SETS				
	Materials, parts, containers, and supplies	(X)	1 493.4	(X)	1 266.1
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes, 1,000 s tons	**15.3	8.6	27.3	15.9
331012	Sheet and strip, do	(S)	[3]	(S)	1.0
331013	Plates, do	(S)	[3]		
331053	All other carbon steel mill shapes and forms, do	(S)	[3]50.7	(S)	56.9
	Alloy steel, except stainless:				
331021	Bars and bar shapes, 1,000 s tons				
331029	All other alloy steel mill shapes and forms, do	(S)	25.6	(S)	48.6
	Stainless steel:				
331033	Sheet and strip, 1,000 s tons			(S)	4.3
331050	All other stainless steel mill shapes and forms, do	(S)	70.3	14.1	38.6
	Copper and copper-base alloy mill shapes and forms:				
335728	Bare wire for electrical conduction, mil lb			(D)	(D)
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes, do	(S)	7.2	(D)	(D)
335143	Plate, sheet, and strip, including military cups and discs, do			(D)	(D)
335152	Pipe and tube, do			(D)	(D)
335001	Aluminum and aluminum-base alloy mill shapes and forms, do	(D)	(D)	(D)	(D)
335792	Insulated wire and cable, except magnet wire (quantity of copper content), do	-	-	(D)	(D)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable), 1,000 s tons	(D)	(D)	(S)	21.7
332045	Steel, do	**7.5	27.0	(X)	59.3
336005	Aluminum and aluminum-base alloy, mil lb	(D)	(D)	(S)	1.9
336006	Copper and copper-base alloy, do	(D)	(D)	(S)	2.2
336008	Other nonferrous, do	(S)	4.9	(S)	5.3
346200	Iron and steel forgings, 1,000 s tons	(D)	(D)	(S)	234.1
359225	Pistons, piston rings, carburetors, valves (intake and exhaust only)	(X)	(D)	(X)	(D)
362120	Integral horsepower electric motors and generators (1 hp and larger), thousands	(S)	130.2	(D)	(D)
369401	Engine electrical equipment, including spark plugs, magnetos, generators, starters, etc	(X)	(D)	(X)	(D)
	Bearings, including mounted and unmounted:				
356218	Ball	(X)	(D)	(X)	7.3
356201	Roller	(X)	(D)	(X)	6
356810	Plain bearings and bushings	(X)	11.1	(X)	7.6
356601	Speed changers, gears, and industrial high-speed drives	(X)	7.9	(X)	16.7
344001	Fabricated structural metal products	(X)	79.6	(X)	35.3
344301	Metal tanks, heat exchangers, steam condensers, and other boiler products, fabricated steel plate, and weldments	(X)	(D)	(X)	15.6
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	6.7	(X)	12.1
346901	Metal stampings	(X)	(D)	(X)	3
354501	Cutting tools for machine tools	(X)	24.8	(X)	12.2
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions, thousands	(D)	(D)	(S)	10.0
356301	Air and gas compressors, except refrigeration compressors, do	(D)	(D)	(D)	(D)
305201	Rubber and plastics hose and belting	(X)	4	(X)	3
329300	Gaskets, all types, and asbestos packing	(X)	1.6	(X)	1.6
308006	Fabricated plastics products (except gaskets)	(X)	(D)	(X)	(D)
280020	Ceramic raw materials, including powders, chemicals, and fibers, excluding refractory uses	(X)	(Z)	(X)	[4]
320601	Ceramic and ceramic composite parts, components, and accessories	(X)	-	(X)	[4]
265001	Paperboard containers and boxes, 1,000 s tons	(S)	4	(S)	1.5
351903	Parts and attachments for internal combustion engines, except gasoline automotive and aircraft (excluding those items listed above)	(X)	(D)	(X)	-
970099	All other materials and components, parts, containers, and supplies consumed	(X)	163.9	(X)	**449.2
971000	Materials, parts, containers, and supplies, n.s.k.[2]	(X)	481.1	(X)	84.4

See footnotes at end of table.

Table 3. **Materials Consumed by Kind: 1987 and 1982**—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material		1987		1982	
			Quantity[1]	Delivered cost (million dollars)	Quantity[1]	Delivered cost (million dollars)
	INDUSTRY 3519, INTERNAL COMBUSTION ENGINES, N.E.C.					
	Materials, parts, containers, and supplies		**(X)**	**5 418.4**	**(X)**	**4 596.4**
	Mill shapes and forms, except castings and forgings:					
	Carbon steel:					
331011	Bars and bar shapes	1,000 s tons	(S)	32.7	*106.1	59.3
331012	Sheet and strip	do	(S)	35.4	**56.3	33.6
331013	Plates	do	(S)	4.4	(S)	9.6
331053	All other carbon steel mill shapes and forms	do			(S)	15.0
	Alloy steel, except stainless:					
331021	Bars and bar shapes	1,000 s tons	(S)	17.9	*44.0	39.5
331029	All other alloy steel mill shapes and forms	do			(S)	6.3
	Stainless steel:					
331033	Sheet and strip	1,000 s tons	(S)	13.6	(S)	24.5
331050	All other stainless steel mill shapes and forms	do				
	Copper and copper-base alloy mill shapes and forms:					
335728	Bare wire for electrical conduction	mil lb	(Z)	(Z)	(S)	(5)
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes	do	(S)	2.3	(S)	2.2
335143	Plate, sheet, and strip, including military cups and discs	do	(S)	9.3	3.2	4.0
335152	Pipe and tube	do	(S)	1.0	(S)	7.0
335001	Aluminum and aluminum-base alloy mill shapes and forms	do	1.6	1.5	(S)	9.2
335792	Insulated wire and cable, except magnet wire (quantity of copper content)	do	(D)	(D)	(S)	19.8
	Castings (rough and semifinished):					
332011	Iron (gray and malleable)	1,000 s tons	(S)	756.6	(S)	743.7
332045	Steel	do	(S)	135.0	(S)	48.7
336005	Aluminum and aluminum-base alloy	mil lb	(S)	527.4	(S)	258.7
336006	Copper and copper-base alloy	do	(D)	(D)	(S)	5.2
336008	Other nonferrous	do	15.3	15.9	(S)	13.1
346200	Iron and steel forgings	1,000 s tons	(S)	289.7	(S)	379.8
359225	Pistons, piston rings, carburetors, valves (intake and exhaust only)		(X)	313.5	(X)	293.4
362120	Integral horsepower electric motors and generators (1 hp and larger)	thousands	(D)	(D)	(D)	(5)
369401	Engine electrical equipment, including spark plugs, magnetos, generators, starters, etc.		(X)	157.0	(X)	174.4
	Bearings, including mounted and unmounted:					
356218	Ball		(X)	18.7	(X)	21.4
356201	Roller		(X)	28.6	(X)	22.5
356810	Plain bearings and bushings		(X)	44.3	(X)	43.5
356601	Speed changers, gears, and industrial high-speed drives		(X)	58.2	(X)	76.3
344001	Fabricated structural metal products		(X)	6.9	(X)	32.4
344301	Metal tanks, heat exchangers, steam condensers, and other boiler products, fabricated steel plate, and weldments		(X)	35.0	(X)	56.0
345001	Bolts, nuts, screws, washers, rivets, and screw machine products		(X)	122.9	(X)	77.9
346901	Metal stampings		(X)	106.5	(X)	55.7
354501	Cutting tools for machine tools		(X)	32.3	(X)	50.4
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions	thousands	(S)	74.5	(S)	36.0
356301	Air and gas compressors, except refrigeration compressors	do	(D)	(D)	(S)	46.4
305201	Rubber and plastics hose and belting		(X)	34.7	(X)	39.4
329300	Gaskets, all types, and asbestos packing		(X)	60.9	(X)	72.3
308006	Fabricated plastics products (except gaskets)		(X)	43.9	(X)	13.3
280020	Ceramic raw materials, including powders, chemicals, and fibers, excluding refractory uses		(X)	2.3	(X)	(4)
320601	Ceramic and ceramic composite parts, components, and accessories		(X)	(D)	(X)	(4)
265001	Paperboard containers and boxes	1,000 s tons	(S)	23.7	(S)	13.5
351903	Parts and attachments for internal combustion engines, except gasoline automotive and aircraft (excluding those items listed above)		(X)	989.6	(X)	422.6
970099	All other materials and components, parts, containers, and supplies consumed		(X)	1 003.3	(X)	4 61 136.6
971000	Materials, parts, containers, and supplies, n.s.k.[2]		(X)	368.6	(X)	245.2
	INDUSTRY 3523, FARM MACHINERY AND EQUIPMENT					
	Materials, parts, containers, and supplies		**(X)**	**2 865.8**	**(X)**	**4 860.2**
	Mill shapes and forms, except castings and forgings:					
	Carbon steel:					
331011	Bars and bar shapes	1,000 s tons	**167.2	94.0	*326.8	171.2
331012	Sheet and strip	do	(S)	226.1	*518.8	255.8
331013	Plates	do	(S)	63.8	*115.2	63.4
331015	Structural shapes	do	(S)	30.9	**81.4	39.4
331017	Wire and wire products	do	(S)	9.4	(S)	8.5
331019	All other carbon steel mill shapes and forms	do	(S)	61.8	*185.7	89.1
	Alloy steel, except stainless:					
331021	Bars and bar shapes	1,000 s tons	(S)	13.0	*30.6	21.1
331029	All other alloy steel mill shapes and forms	do	(S)	4.0	(S)	6.5
	Stainless steel:					
331033	Sheet and strip	1,000 s tons	*6.2	10.5	(S)	7.0
331050	All other stainless steel mill shapes and forms	do	(S)	2.8	(S)	2.6
	Copper and copper-base alloy:					
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes	mil lb	(S)	2.1	(S)	2.0
335152	Pipe and tube	do	*5.7	8.1	*23.5	16.9

See footnotes at end of table.

Table 3. **Materials Consumed by Kind: 1987 and 1982**—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987 Quantity[1]	1987 Delivered cost (million dollars)	1982 Quantity[1]	1982 Delivered cost (million dollars)
	INDUSTRY 3523, FARM MACHINERY AND EQUIPMENT—Con.				
	Mill shapes and forms, except castings and forgings—Con.				
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ..... mil lb	*3.9	4.6	**3.8	2.9
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ..... do	(S)	1.4	*4.0	4.4
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ..... do	(S)	.4	(S)	1.2
346901	Metal stampings	(X)	31.9	(X)	68.0
339915	Metal powders ..... mil lb	(S)	1.9	(S)	.6
331051	Pig iron, excluding silvery iron ..... 1,000 s tons	(D)	(7)	*20.0	4.6
190023	Iron and steel scrap, excluding home scrap ..... do	(S)	2.4	65.4	19.2
	Castings (rough and semifinished):				
332011	Iron (gray and malleable) ..... 1,000 s tons	(S)	104.0	*242.4	219.4
332045	Steel ..... do	(S)	10.6	**90.5	41.4
336005	Aluminum and aluminum-base alloy ..... mil lb	(S)	11.6	*10.7	18.3
336006	Copper and copper-base alloy ..... do	(S)	7.4	(S)	5.7
336008	Other nonferrous ..... do	(S)	1.8	18.7	5.9
346200	Iron and steel forgings ..... 1,000 s tons	(S)	49.2	**56.7	89.9
349301	Steel springs, except wire ..... do	(S)	5.0	*7.7	9.9
349271	Fluid power (hydraulic and pneumatic) valves	(X)	17.8	(X)	25.4
349261	Fluid power (hydraulic and pneumatic) hose or tube fittings and assemblies	(X)	15.4	(X)	30.5
	Engines:				
351920	Diesel and semidiesel ..... thousands	(S)	85.8	94.7	381.0
351901	Gasoline and other carburetor ..... do	**200.6	69.2	**160.6	27.3
	Electric motors and generators:				
362115	Fractional horsepower electric motors (less than 1 hp), excluding timing motors ..... thousands	605.5	11.2	(S)	12.3
362120	Integral horsepower motors and generators (1 hp and larger) ..... do	(S)	7.3	(S)	11.7
	Bearings, including mounted and unmounted:				
356218	Ball	(X)	33.7	(X)	63.7
356201	Roller	(X)	17.8	(X)	34.6
356810	Plain bearings and bushings	(X)	11.4	(X)	15.9
356601	Speed changers, gears, and industrial high-speed drives	(X)	66.3	(X)	124.6
	Pumps (complete assemblies):				
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions ..... thousands	*635.8	42.4	*823.9	99.7
356102	Other pumps ..... do	(S)	6.6	(S)	9.0
359301	Fluid power (hydraulic and pneumatic) cylinders and rotary actuators	(X)	18.2	(X)	32.5
359302	Hydraulic and pneumatic equipment, except pumps, compressors, valves, cylinders, and rotary actuators	(X)	14.1	(X)	45.0
369401	Engine electrical equipment, spark plugs, magnetos, generators, starters, etc.	(X)	32.5	(X)	65.7
301101	Pneumatic tires and inner tubes ..... millions	(S)	66.1	*3.8	192.5
301102	Semipneumatic tires ..... do	(S)	4.2	*2.0	11.8
242101	Rough and dressed lumber ..... mil bd ft	(S)	8.1	(S)	9.1
285101	Paints, varnishes, lacquers, shellacs, japans, enamels, and allied products ..... 1,000 gal	*3 618.1	22.9	*5 023.9	36.3
305201	Rubber and plastics hose and belting	(X)	29.2	(X)	33.5
306902	Fabricated rubber products, except tires, tubes, hoses, beltings, and gaskets	(X)	14.8	(X)	32.4
308006	Fabricated plastics products, except gaskets	(X)	43.0	(X)	41.9
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	52.1	(X)	87.8
349681	Wire chain	(X)	1.2	(X)	2.1
354501	Cutting tools for machine tools	(X)	10.7	(X)	17.5
970099	All other materials and components, parts, containers, and supplies	(X)	7677.7	(X)	1 446.1
971000	Materials, parts, containers, and supplies, n.s.k.[2]	(X)	727.4	(X)	795.4
	INDUSTRY 3524, LAWN AND GARDEN EQUIPMENT				
	Materials, parts, containers, and supplies	**(X)**	**2 502.9**	**(X)**	**1 301.4**
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ..... 1,000 s tons	154.0	68.7	*48.7	21.3
331012	Sheet and strip ..... do	*236.6	116.7	*147.8	65.7
331013	Plates ..... do	**5.4	2.4	**2.0	1.0
331015	Structural shapes ..... do	(S)	8.4	*2.7	2.2
331017	Wire and wire products ..... do	(S)	5.7	(S)	1.4
331019	All other carbon steel mill shapes and forms ..... do	(S)	12.9	**9.7	4.8
	Alloy steel, except stainless:				
331021	Bars and bar shapes ..... 1,000 s tons	(S)	12.1	(S)	3.9
331029	All other alloy steel mill shapes and forms ..... do				
	Stainless steel:				
331033	Sheet and strip ..... 1,000 s tons	(Z)	(Z)	(D)	(D)
331050	All other stainless steel mill shapes and forms ..... do	(D)	(D)	(D)	(D)
	Copper and copper-base alloy:				
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes ..... mil lb	(S)	4.4	(S)	*5
335152	Pipe and tube ..... do				
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ..... mil lb	(D)	(D)		
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ..... do	(D)	(D)	(S)	7.6
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ..... do	(D)	(D)		
346901	Metal stampings	(X)	134.5	(X)	32.2
339915	Metal powders ..... mil lb	(S)	17.5	*7.7	9.8

See footnotes at end of table.

Table 3. **Materials Consumed by Kind: 1987 and 1982**—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material		1987 Quantity[1]	1987 Delivered cost (million dollars)	1982 Quantity[1]	1982 Delivered cost (million dollars)
	INDUSTRY 3524, LAWN AND GARDEN EQUIPMENT—Con.					
331051	Pig iron, excluding silvery iron	1,000 s tons	–	–	(D)	(D)
190023	Iron and steel scrap, excluding home scrap	do	(Z)	(Z)	(D)	(D)
	Castings (rough and semifinished):					
332011	Iron (gray and malleable)	1,000 s tons	**15.4	19.4	*9.4	10.7
332045	Steel	do	6.0	12.9	(S)	3.5
336005	Aluminum and aluminum-base alloy	mil lb	32.5	45.8	**52.3	33.5
336006	Copper and copper-base alloy	do	(D)	(D)	(D)	(D)
336008	Other nonferrous	do	(D)	(D)	18.6	5.6
346200	Iron and steel forgings	1,000 s tons	(S)	4.8	**1.5	2.8
349301	Steel springs, except wire	do	(S)	1.3	(S)	6
349271	Fluid power (hydraulic and pneumatic) valves		(X)	(D)	(X)	2.2
349261	Fluid power (hydraulic and pneumatic) hose or tube fittings and assemblies		(X)	2.4	(X)	9
	Engines:					
351920	Diesel and semidiesel	thousands	(D)	(D)	(S)	11.5
351901	Gasoline and other carburetor	do	6 524.6	721.8	*3 348.3	294.1
	Electric motors and generators:					
362115	Fractional horsepower electric motors (less than 1 hp), excluding timing motor	thousands	(S)	2.6	354.5	3.5
362120	Integral horsepower motors and generators (1 hp and larger)	do	(D)	(D)	(D)	(D)
	Bearings, including mounted and unmounted:					
356218	Ball		(X)	13.4	(X)	7.7
356201	Roller		(X)	10.3	(X)	4.1
356810	Plain bearings and bushings		(X)	4.5	(X)	16.1
356601	Speed changers, gears, and industrial high-speed drives		(X)	78.8	(X)	(D)
	Pumps (complete assemblies):					
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions	thousands	**252.3	22.9	**114.0	10.1
356102	Other pumps	do	**5.7	.5	(D)	(D)
359301	Fluid power (hydraulic and pneumatic) cylinders and rotary actuators		(X)	2.9	(X)	1.7
359302	Hydraulic and pneumatic equipment, except pumps, compressors, valves, cylinders, and rotary actuators		(X)	(D)	(X)	(D)
369401	Engine electrical equipment (spark plugs, magnetos, generators, starters, etc.)		(X)	43.7	(X)	7.8
301101	Pneumatic tires and inner tubes	millions	8.8	64.5	(S)	26.6
301102	Semipneumatic tires	do	12.6	22.2	*14.2	11.1
242101	Rough and dressed lumber	mil bd ft	(S)	3.7	(S)	1.3
285101	Paints, varnishes, lacquers, shellacs, japans, enamels, and allied products	1,000 gal	*1 190.6	13.5	(S)	6.1
305201	Rubber and plastics hose and belting		(X)	18.1	(X)	7.0
306902	Fabricated rubber products, except tires, tubes, hoses, belting, and gaskets		(X)	9.0	(X)	6.4
308006	Fabricated plastics products, except gaskets		(X)	113.2	(X)	41.9
345001	Bolts, nuts, screws, washers, rivets, and screw machine products		(X)	65.3	(X)	26.5
349681	Wire chain		(X)	(D)	(X)	(D)
354501	Cutting tools for machine tools		(X)	2.8	(X)	(D)
970099	All other materials and components, parts, containers, and supplies		(X)	408.4	(X)	339.2
97100U	Materials, parts, containers, and supplies, n.s.k.[2]		(X)	353.1	(X)	222.2

[1]For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

[2]Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

[3]For 1987, data for material codes 331C12 and 331013 are combined with material code 331053 to avoid disclosing data for individual companies.

[4]For 1982, data for materials codes 280020 and 320601 were not collected separately but were included with material code 970099.

[5]For 1982, data for material code 335728 were combined with material code 335792 to avoid disclosing data for individual companies.

[6]For 1982, data for material code 362120 were combined with material code 970099 to avoid disclosing data for individual companies.

[7]For 1987, data for material code 331051 are combined with material code 970099 to avoid disclosing data for individual companies.

[8]For 1982, total included data for filters for hydraulic fluid power systems and pistons, piston rings, carburetors, and valves (intake and exhaust only). These materials were collected separately in 1982 but were withheld to avoid disclosing data for individual companies.

[9]For 1982, data included plate, sheet, and strip, including military cups and discs.

APPENDIX
Scope and Coverage and Explanation of Terms

GENERAL

The 1987 Census of Manufactures is the 32nd census of manufacturing establishments conducted in the United States. For 1987, it was conducted as part of the economic censuses, which included the censuses of mineral industries, construction industries, retail and wholesale trades, service industries, selected transportation activities, and minority-owned and women-owned businesses, under authority of title 13 of the United States Code. Title 13 specifies that an economic census be conducted every 5 years to cover years ending in 2 and 7.

SCOPE AND COVERAGE

Establishment Basis of Reporting

The census of manufactures is conducted on an establishment basis. All manufacturing establishments with one paid employee or more at any time during the year are covered by the census of manufactures. Therefore, a company operating at more than one location is required to file a separate report for each location. This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units which service manufacturing establishments of the same company. Where these auxiliary operations are conducted at the same location as the manufacturing operation, they are usually included in the report for the operating manufacturing establishment.

Use of Administrative Records

From a universe of approximately 350,000 manufacturing establishments in the 1987 Census of Manufactures, approximately 150,000 small single-establishment companies were excused from filing reports. Selection of the small establishment nonmail cases was done on an industry-by-industry basis. A variable cutoff was used to determine those establishments for which administrative records were to be used in place of a census report. The cutoffs were selected so the administrative-record cases would account for approximately 3 percent or less of the value of shipments for the industry. These cutoffs were then adjusted so that all single-establishment companies with less than 5 employees were excluded from the mail canvass, while all establishments with more than 20 employees were included. Where establishments in the 5 to 20 employee size range were included in the mail canvass, an abbreviated census form was frequently used.

For these nonmail establishments, (and a small number of larger establishment whose reports were not received at the time the data were tabulated) data on employment, payroll, and receipts were obtained from administrative records of other government agencies rather than from census forms. The administrative-record information was then used in conjunction with industry averages to estimate the data for these establishments. The value of shipments and cost of materials were not distributed among specific products and materials but were included in the product and material "not specified by kind" (n.s.k.) categories.

EXPLANATION OF TERMS

Number of establishments and companies–A separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

All employees–Includes all full-time and part-time employees on the payrolls at any time during the year. Included are all persons on paid sick leave, paid holidays, and paid vacations. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average of those for midmonth payroll periods of March, May, August, and November.

Production workers–Includes workers up through the working-supervisor level engaged in fabricating, processing, assembling, inspecting, receiving, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, guard services, product development, auxiliary production for plant's own use (e.g., powerplant), recordkeeping, and other closely associated services. Truckdrivers delivering ready-mixed concrete are also included in production workers.

Other employees–Includes nonproduction personnel, including those engaged in the following activities: supervision above working-supervisor level, sales (including driver/salespersons), sales delivery (truckdrivers and helpers), advertising, credit collection, installation and

servicing of own product, clerical and routine office functions, executive, purchasing, finance, legal, personnel (including cafeteria, etc.), professional, and technical employees.

Payroll–Includes the gross earnings for the "employees" defined above, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Respondents were told that in reporting they could follow the definition of payrolls used for calculating the Federal withholding tax.

Production-worker hours–Covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave when the employee was not at the plant.

Cost of materials–Refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuels consumed, regardless of whether they were purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (a) all raw materials, semifinished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year; (b) electric energy purchased; (c) fuels consumed for heat, power, or generating electricity; (d) work done by others on materials or parts furnished by manufacturing establishments (contract work); and (e) products bought and resold in the same condition.

Specific materials consumed (table 3)–In addition to the total cost of materials which every establishment was required to report, information was also collected for most manufacturing industries on the consumption of major materials used in manufacturing. These inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Establishments consuming less than a specified amount (usually $10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which administrative records were used was estimated as "not specified by kind" (n.s.k.).

Value of shipments and other receipts–Generally refers to received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts such as receipts for contract work performed for others, installation and repair receipts, sale of scrap, and sale of products bought and resold without further processing. Included are all items made by or for the establishment from materials owned by it whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In a few industries, the value of production or value of work completed is used instead of value of shipments. These industries are identified in the introduction and are footnoted in table 1.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, that is, including not only the direct costs of production but also a reasonable proportion of "all other costs" (including company overhead and profit).

Shipments or production of individual products (table 2)–In the 1987 census, detailed shipment information was collected for approximately 11,000 individual products. These products are identified by a seven-digit code and are grouped into approximately 1,500 classes of products, which in turn are primary to 459 four-digit industries. Data at the five-digit product-class level have been collected each year as part of the annual survey of manufactures. Information at the seven-digit level, collected for many industries in the current industrial reports program, is not included in this table.

Value added by manufacture–This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments for products manufactured plus receipts for services rendered. The result of this calculation is then adjusted by the addition of value added by merchandising operations (that is, the difference between the sales value and cost of merchandise sold without further manufacturing, processing, or assembly) plus the net change in finished goods and work-in-process inventories between the beginning and end of the year.

For those industries where value of production is collected instead of value of shipments (see footnote in table 1), value added is adjusted only for the change in work-in-process inventories between the beginning and end of the year. For those industries where value of work done is collected, the value added does not include an adjustment for the change in finished goods or work-in-process inventories.

Value added avoids the duplication in the figure for value of shipments which results from the use of products of some establishments as materials by others. Value

added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

Expenditures for new plant and equipment–Establishments in operation and any known plants under construction were asked to report their expenditures for (a) permanent additions and major alterations to manufacturing establishments and (b) new machinery and equipment used for replacement and additions to plant capacity if they are of the type for which depreciation accounts are ordinarily maintained.

These totals exclude expenditures for used plant and equipment, expenditures for land, and cost of maintenance and repairs charged as current operating expenses. Data for used plant and equipment will be published in the final industry bulletin.

End-of-year inventories–Comprised of (a) finished products; (b) work-in-process; and (c) materials, supplies, fuels, etc. Beginning in 1982, respondents were asked to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior years in which respondents were permitted to value their inventories using any generally accepted accounting method. Therefore, 1982 through 1987 data for inventories are not strictly comparable to prior-year data.

Specialization and coverage ratios–An establishment is classified in a particular industry if its shipments of primary products of the industry exceed in value its shipments of the products of any other single industry. An establishments' shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). The following ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in table 1 and data on product shipments shown in table 2.

Specialization ratio–Represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio–Represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments, wherever classified.

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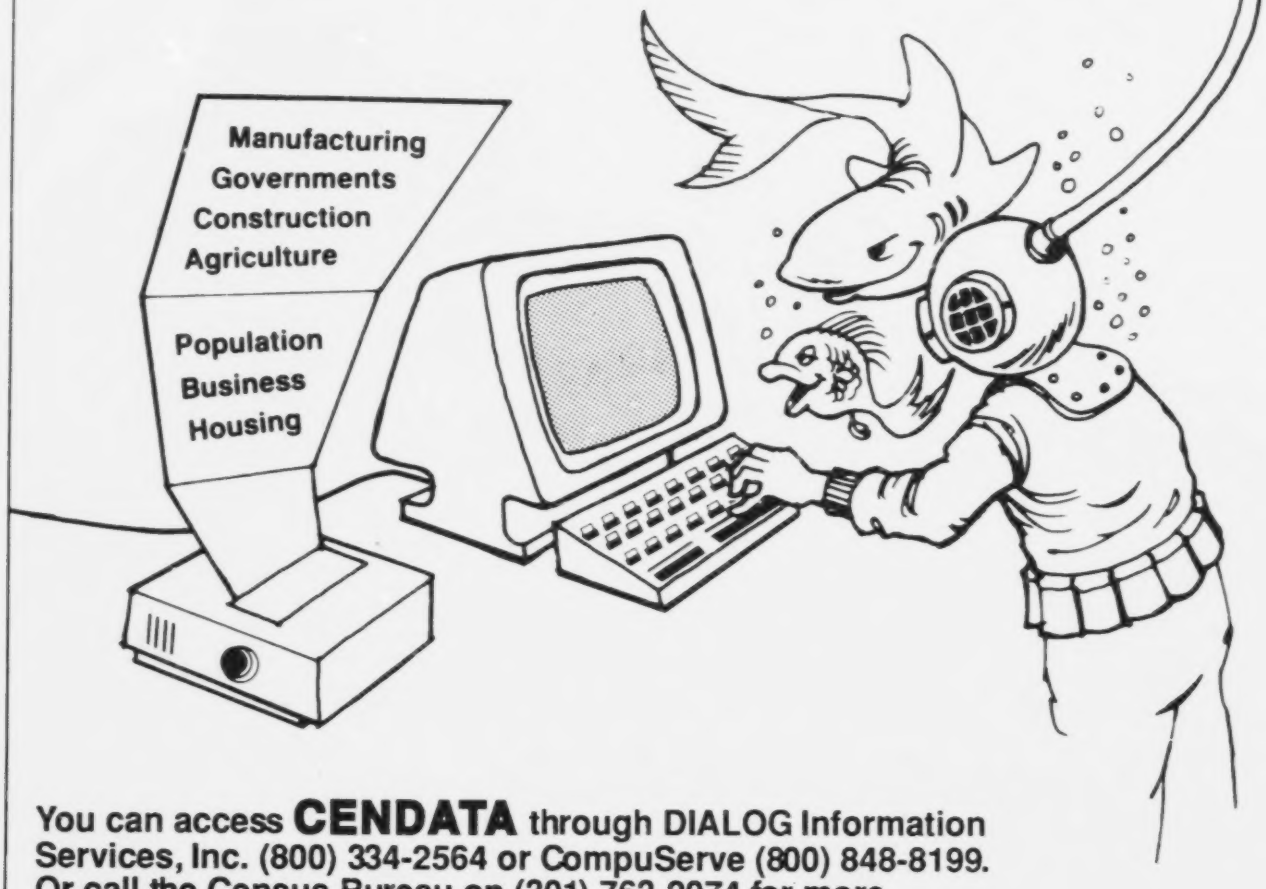

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